light should be about twenty inches from the microscope, and the globe sufficiently supported so as not to oscillate. The light obtained is bright but not dazzling, and of a soft green color that is extremely agreeable to the eyes. A screen of some kind should be used to protect the eyes from the light and heat of the lamp or gas-flame used. The apparatus is referred to in the "Botanische Practicum" as the *Schuster Kugel*.—D. H. CAMPBELL, *Bonn*.

The influence of heredity upon vigor.—The results of two series of experiments with the tomato plant, carried on during the past three seasons, furnish a forcible illustration of the influence of the health of the parents upon progeny in plants.

In the fall of 1883 a single plant was noticed in a row of tomatoes that appeared more feeble, and had more of its fruits decayed than any other. A few seeds were gathered from some of the sound fruits of this feeble plant, and at the same time, a few from sound fruits on a neighboring plant that appeared healthy and vigorous. The following spring the two samples of seeds were sown, and the young plants transplanted to adjoining rows in the garden. It was a surprise to find that in habit the plants of each row closely resembled the parents, *i. e.*, the progeny of the feeble plant was also feeble, even more so than was the parent, while that of the vigorous plant appeared entirely healthy. The difference in the two rows was so marked that, but for the unquestionable identity of the fruit, one would scarcely have thought it possible that they could be of the same variety. The same selections of seed were continued through 1885 and 1886, with like results. The past season the progeny of the feeble plant of 1883 scarcely exceeded one-fourth the size of that of the vigorous one. The plants lay prostrate on the ground, with discolored and shriveled foliage, and with the fruits fully one-half decayed before frost came. This decay is a soft rot, quite different from the black rot that so often affects tomatoes. The fruit becomes soft and collapses without changing color, the skin finally bursts, permitting the contents to flow out, when the skin dries without detaching itself from the plant.

In the second series of experiments plants were grown through three successive generations from seed taken from quite immature fruits. In one instance seeds were gathered in every case from fruits that had not commenced to change color toward ripeness; in the other they were taken from entirely ripe fruits. It is of interest to observe that the effect of the immature seed upon the vigor of the progeny was precisely similar to that of the seeds from the enfeebled plant above noted. The plants grew more and more feeble, until they failed to attain more than a fourth the size of those grown from ripe fruit.

Several varieties of tomatoes now cultivated show evidences in their manner of growth of having been originated by the selection of too imma-

ture seed. This course may have been taken to secure earliness. Practical deductions, however, may be left for the cultivator; present interest centers more especially in the fact, illustrated by the experiments, that the hereditary law of the transmission of vigor holds as strongly in the vegetable as in the animal kingdom.—EMMETT S. GOFF.

Petroleum Spirit as a Plant Preservative.—If petroleum spirit (boiling from 25°–45°C.) has not been employed for preserving plants intended for the study of chemical constituents, I should like to propose it.

Plants for macro-chemical work are usually preserved by drying. Dried plants have lost volatile substances, particularly volatile oils. Chemical changes, too, have been produced by plants remaining in contact with air. Since the first step in the chemical analysis of the plant is to treat it with petroleum spirit, and as cold maceration requires a good deal of time for complete extraction, time is actually saved by thus keeping the plant.

I am not proposing petroleum spirit as a preservative entirely on my own experience. An experienced chemist to whom I spoke thought it would be excellent. After beginning the analysis of different plants, he had several times been interrupted and obliged to keep them in petroleum spirit for a year at least. If kept in the dark he invariably found them in good condition.

Dried plants are not fit for microscopic study, even if their chemical constituents are unaltered. Their cells are contracted and they break so readily that sections are not conveniently made. Therefore plants must be kept in a liquid. Ordinary alcohol removes too many constituents and renders the plants too brittle. In a measure the same is true of absolute alcohol. Moreover absolute alcohol absorbs water so rapidly that it is troublesome, and it is too expensive. Since Dr. H. W. Jayne, of Frankfort, Philadelphia, has undertaken the manufacture of petroleum spirit it is easily obtained and does not cost a great deal. Ordinarily it removes only a little chlorophyll and volatile and fixed oils. If these constituents are to be especially studied, the previous macro chemical examination would show in what they were insoluble and the plants preserved in these. My experience has been that petroleum spirit does not contract the plant or render it brittle, as does alcohol. Since petroleum spirit does not remove water, I should think this would be true in most cases.

The rapidity of evaporation of petroleum spirit is objectionable because of waste and the danger of fire. But rapidity of evaporation is not always disadvantageous. One can thus easily free the object from petroleum spirit if it is desired to mount in something else.—LILLIE J. MARTIN.

[Histologists will notice that Miss Martin does not claim that petroleum spirit is a suitable preservative for tissues for histological examination. Cell-walls are admirably preserved by it, but the structure of the cell contents is not well shown. The liquid is so volatile as to make the handling of sections almost impossible. Nor does the petroleum spirit harden specimens suitably for section cutting. We call attention to these points lest some one may be disappointed by hoping to preserve histological material by this liquid.—EDS.]